

THAT WHICH IS CLAIMED:

- 5 1. A damage tolerant shaft comprising:
an annular body symmetrical about an axis; and
a plurality of ribs extending inwardly from said annular body and
connecting within an interior of said annular body,
wherein said annular body and said plurality of ribs cooperate to define
a plurality of voids extending lengthwise therealong.
- 10 2. The damage tolerant shaft of claim 1, wherein said annular body and
said plurality of ribs are made of a composite material.
- 15 3. The damage tolerant shaft of claim 1, wherein said annular body and
said plurality of ribs are made of a metallic material.
- 20 4. The damage tolerant shaft of claim 1, wherein said annular body and
said plurality of ribs are made of an organic material.
5. The damage tolerant shaft of claim 1, wherein said annular body and
said plurality of ribs are made of an inorganic material.
- 25 6. The damage tolerant shaft of claim 1, wherein said annular body and
said plurality of ribs are made of organic and inorganic materials.
7. The damage tolerant shaft of claim 2, wherein at least one of said
annular body and said plurality of ribs includes a plurality of reinforcing fibers
oriented in a direction perpendicular to the axis about which said annular body
is symmetrical.
- 30 8. The damage tolerant shaft of claim 2, further comprising a filler
material disposed within interstices between said annular body and said
plurality of ribs and between said plurality of ribs at the point of connection.

9. A damage tolerant shaft comprising:

a plurality of lobes, said lobes shaped relative to one another such that said lobes are capable of being positioned to define an annular body and a plurality of ribs extending within the annular body; and
a filler disposed between portions of adjacent lobes.

10. The damage tolerant shaft of claim 9, wherein said plurality of lobes are formed of a composite material.

11. The damage tolerant shaft of claim 9, further comprising an outer layer surrounding said plurality of lobes to thereby further define the annular body.

12. The damage tolerant shaft of claim 11, wherein said plurality of lobes and said outer layer are formed of a composite material.

13. The damage tolerant shaft of claim 11, wherein said filler is disposed within interstices between said outer layer and said plurality of lobes.

14. The damage tolerant shaft of claim 10, wherein said plurality of lobes formed of the composite material each comprise a plurality of reinforcing fibers extending at least partially about a respective lobe.

15. The damage tolerant shaft of claim 10, wherein the plurality of ribs include a plurality of reinforcing fibers oriented in a direction perpendicular to the axis about which the annular body is symmetrical.

16. The damage tolerant shaft of claim 12, wherein said outer layer formed of the composite material comprises a plurality of reinforcing fibers extending at least partially about said plurality of lobes.

17. A method of fabricating a damage tolerant shaft, the method comprising:

forming a plurality of lobes from a plurality of reinforcing fibers extending at least partially about a respective lobe;

positioning the plurality of lobes relative to one another such that the lobes define an annular body and a plurality of ribs extending within the annular body;

filling interstices between portions of adjacent lobes with a filler;

impregnating the plurality of fibers forming the plurality of lobes with resin; and

curing the plurality of lobes.

18. The method of fabricating a damage tolerant shaft of claim 17, further comprising surrounding the plurality of lobes with an outer layer formed of reinforcing fibers extending at least partially about the plurality of lobes prior to resin impregnation.

19. The method of fabricating a damage tolerant shaft of claim 18, further comprising impregnating the reinforcing fibers forming the outer layer with resin prior to curing.

20. The method of fabricating a damage tolerant shaft of claim 19, further comprising curing the outer layer.

21. The method of fabricating a damage tolerant shaft of claim 17, wherein forming the plurality of lobes comprises reinforcing the plurality of ribs with a plurality of reinforcing fibers oriented in a direction perpendicular to an axis about which the annular body is symmetrical.

22. The method of fabricating a damage tolerant shaft of claim 17, wherein impregnating the plurality of fibers and curing the plurality of lobes occurs prior to positioning the plurality of lobes relative to one another.

23. The method of fabricating a damage tolerant shaft of claim 20, wherein curing the plurality of lobes occurs prior to curing the outer layer.

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24. The method of fabricating a damage tolerant shaft of claim 20, wherein curing the plurality of lobes and curing the outer layer occur simultaneously.

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